

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C. 20231
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 24 August 2000 (24.08.00)	
International application No. PCT/US99/30141	Applicant's or agent's file reference MCA-433 PC
International filing date (day/month/year) 17 December 1999 (17.12.99)	Priority date (day/month/year) 17 December 1998 (17.12.98)
Applicant PEARL, Steven, R. et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 17 July 2000 (17.07.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38
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From the INTERNATIONAL SEARCHING AUTHORITY

To: TIMOTHY J. KING
MILLIPORE CORPORATION
80 ASHBY ROAD
BEDFORD, MA 01730

RECEIVED

MAR 27 2000

LEGAL DEPT.

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

Date of Mailing
(day/month/year)

Applicant's or agent's file reference

MCA-433 PC

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.

PCT/US99/30141

International filing date
(day/month/year)

17 DECEMBER 1999

Applicant

MILLIPORE CORPORATION

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Further action(s): The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in rules 90 bis 1 and 90 bis 3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

SUN UK KIM

Telephone No. (703) 308-0661

DEBORAH THOMAS
PARALEGAL SPECIALIST

From the INTERNATIONAL SEARCHING AUTHORITY

To: TIMOTHY J. KING
MILLIPORE CORPORATION
80 ASHBY ROAD
BEDFORD, MA 01730

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

Date of Mailing
(day/month/year)

22 MAR 2000

Applicant's or agent's file reference

MCA-433 PC

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.

PCT/US99/30141

International filing date
(day/month/year)

17 DECEMBER 1999

Applicant

MILLIPORE CORPORATION

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the international search report; however, for more details, see the notes on the accompanying sheet.

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For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

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☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau.

If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in rules 90 bis 1 and 90 bis 3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

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Commissioner of Patents and Trademarks
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Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

SUN UK KIM

Telephone No. (703) 308-0661

DEBORAH THOMAS
PARALEGAL SPECIALIST

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference MCA-433 PC	FOR FURTHER ACTION <small>see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</small>	
International application No. PCT/US99/30141	International filing date (day/month/year) 17 DECEMBER 1999	(Earliest) Priority Date (day/month/year) 17 DECEMBER 1998
Applicant MILLIPORE CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I).
2. ☒ Unity of invention is lacking (See Box II).
3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing
 - ☐ filed with the international application.
 - ☐ furnished by the applicant separately from the international application,
 - ☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
 - ☐ transcribed by this Authority.
4. With regard to the title,
 - ☒ the text is approved as submitted by the applicant.
 - ☐ the text has been established by this Authority to read as follows:
5. With regard to the abstract,
 - ☒ the text is approved as submitted by the applicant.
 - ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the drawings to be published with the abstract is:

Figure No. 8

 - ☐ as suggested by the applicant.
 - ☒ because the applicant failed to suggest a figure.
 - ☐ because this figure better characterizes the invention.
 - ☐ None of the figures.

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐

The additional search fees were accompanied by the applicant's protest.

☐

No protest accompanied the payment of additional search fees.

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : B01D 63/02, 63/04, 63/10; B65H 81/00

US CL : Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 210/321.74, 321.78, 321.79, 321.8, 321.83, 321.87, 321.88, 32.89, 497.1, 488, 500.23; 156/169, 173, 175

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,622,086 A (PUCK et al) 11 November 1986 (11.11.86), see entire document.	1-25
Y	US 4,631,128 A (COPLAN et al) 23 December 1986 (23.12.86), see entire document.	1-25
Y	US 4,838,970 A (THIBOS) 13 June 1989 (13.06.89), see entire document.	1-25
Y	US 4,348,458 A (OTSTOT) 07 September 1982 (07.09.82), see entire document.	22

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
B earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

17 FEBRUARY 2000

Date of mailing of the international search report

22 MAR 2000

 Name and mailing address of the ISA/US
 Commissioner of Patents and Trademarks
 Box PCT
 Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

SUN UK KIM

Telephone No. (703) 308-0661

 DEBORAH THOMAS
 PARALEGAL SPECIALIST

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

210/321.74, 321.78, 321.79, 321.8, 321.83, 321.87, 321.88, 32.89, 497.1, 488, 500.23; 156/169, 173, 175

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claims 1-11, drawn to a multi-layered coiled hollow fiber bundle comprising a **plurality of coiled hollow fibers arranged so as to create at least two layers.**

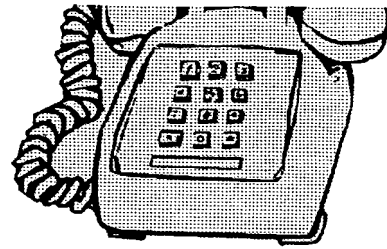
Group II, claims 12-18, drawn to a method for producing a multi-layered coiled hollow fiber bundle comprising the steps of **determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer.**

Group III, claims 19-21, drawn to a method of manufacturing a multi-layered separation module comprising the steps of **selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the pre-selected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers.**

Group IV, claims 22-25, drawn to a single layered coiled hollow separation module comprising a **layer of coiled hollow fibers and a housing.**

The inventions listed as Groups I-IV do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: All of the groupings are directed to a method or apparatus for coiled hollow fiber bundle, but each group has a different special technical feature not shared by the remaining groups. Group I is directed to an apparatus which has the special technical feature of **a plurality of coiled hollow fibers arranged so as to create at least two layers** not shared by any of the remaining groups. Group II is directed to an method which has the special technical feature of **determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer** not shared by any of the remaining groups. Group III is directed to an method which has the special technical feature of **selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the pre-selected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers** not shared by any of the remaining groups. Group IV is directed to an apparatus which has the special technical feature of **a layer of coiled hollow fibers and a housing** not shared by any of the remaining groups.

**FOR
LACK OF UNITY OF INVENTION**



PCT No.: PCT/US99/30141

Examiner: SUN UK KIM

Attorney spoken to: TIMOTHY J. KING

Date of call: 16 FEBRUARY 2000

- ☒ Amount of payment approved: \$630.00
- ☒ Deposit account number to be charged: 13-3577
- ☒ Attorney elected to pay for ALL additional inventions
- ☐ Attorney elected to pay only for the additional inventions covered by
 - ☐ Group(s):
 - encompassing —
 - ☐ Claim(s):
- ☐ Attorney elected **NOT** to pay for any additional inventions, therefore, only the first claimed invention (Group I) covered by Claim(s) _ has been searched.
- ☒ Attorney was orally advised that there is no right to protest for any group not paid for.
- ☒ Attorney was orally advised that any protest must be filed no later than 15 days from the mailing of the Search Report (PCT/ISA/210).

Time Limit For Filing A Protest

Applicant is hereby given 15 days from the mailing date of this Search Report in which to file a protest of the holding of lack of unity of invention. In accordance with PCT Rule 40.2, applicant may protest the holding of lack of unity only with respect to the group(s) paid for.

Detailed Reasons For Holding Lack Of Unity Of Invention:

Detailed Reasons For Holding Lack of Unity Of Invention:
(Continued on a separate sheet)

Note: A copy of this form must be attached to the Search Report.

**ATTACHMENT TO CHAPTER I PCT TELEPHONE MEMORANDUM
FOR
LACK OF UNITY OF INVENTION**

Detailed Reasons For Holding Lack Of Unity Of Invention:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claims 1-11, drawn to a multi-layered coiled hollow fiber bundle comprising a plurality of coiled hollow fibers arranged so as to create at least two layers.

Group II, claims 12-18, drawn to a method for producing a multi-layered coiled hollow fiber bundle comprising the steps of determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer.

Group III, claims 19-21, drawn to a method of manufacturing a multi-layered separation module comprising the steps of selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the pre-selected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers.

Group IV, claims 22-25, drawn to a single layered coiled hollow separation module comprising a layer of coiled hollow fibers and a housing.

The inventions listed as Groups I-IV do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: All of the groupings are directed to a method or apparatus for coiled hollow fiber bundle, but each group has a different special technical feature not shared by the remaining groups. Group I is directed to an apparatus which has the special technical feature of a plurality of coiled hollow fibers arranged so as to create at least two layers not shared by any of the remaining groups. Group II is directed to a method which has the special technical feature of

determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer not shared by any of the remaining groups. Group III is directed to a method which has the special technical feature of selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the pre-selected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers not shared by any of the remaining groups. Group IV is directed to an apparatus which has the special technical feature of a layer of coiled hollow fibers and a housing not shared by any of the remaining groups.

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: TIMOTHY J. KING
MILLIPORE CORPORATION
80 ASHBY ROAD
BEDFORD, MA 01730

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JAN 23 2001
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file

NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of Mailing
(day/month/year)

22 JAN 2001

Applicant's or agent's file reference

MCA-433 PC

IMPORTANT NOTIFICATION

International application No.

PCT/US99/30141

International filing date (day/month/year)

17 DECEMBER 1999

Priority Date (day/month/year)

17 DECEMBER 1998

Applicant

MILLIPORE CORPORATION

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Docketed By:	166 1-30-01
Due Date:	
Reminder (s)	
Action Due:	
In Database	

Name and mailing address of the IPEA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

SUN UK KIM

Telephone No. (703) 308-0661

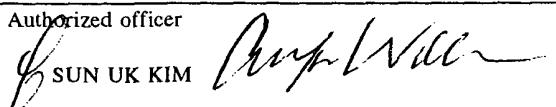
PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference MCA-433 PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/30141	International filing date (day/month/year) 17 DECEMBER 1999	Priority date (day/month/year) 17 DECEMBER 1998
International Patent Classification (IPC) or national classification and IPC Please See Supplemental Sheet.		
Applicant MILLIPORE CORPORATION		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>0</u> sheets.</p>
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of report with regard to novelty, inventive step or industrial applicability</p> <p>IV <input checked="" type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>

Date of submission of the demand 17 JULY 2000	Date of completion of this report 09 JANUARY 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer  SUN UK KIM
Facsimile No. (703) 305-3230	Telephone No. (703) 308-0661

I. Basis of the report**1. With regard to the elements of the international application:***

- ☒ the international application as originally filed
- ☒ the description:
pages 1-31 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____
- ☒ the claims:
pages 32-35 , as originally filed
pages NONE , as amended (together with any statement) under Article 19
pages NONE , filed with the demand
pages NONE , filed with the letter of _____
- ☒ the drawings:
pages 1-11 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____
- ☒ the sequence listing part of the description:
pages NONE , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages NONE
- ☒ the claims, Nos. NONE
- ☒ the drawings, sheets/fig NONE

5. ☐ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

***Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

Please See Supplemental Sheet.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. ..

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)	Claims <u>19-21</u>	YES
	Claims <u>1-18, 22-25</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-25</u>	NO
Industrial Applicability (IA)	Claims <u>1-25</u>	YES
	Claims <u>NONE</u>	NO

2. citations and explanations (Rule 70.7)

Claims 1-18 and 22-25 lack novelty under PCT Article 33(2) as being anticipated by U.S. Patent No. 5,626,758 (hereinafter referred to as Belfort). Belfort teaches a multi-layered coiled hollow fiber bundle designed to provide a specific performance output to create Dean vortices when subjected to a certain velocity wherein performance depends on the hollow fibers' inner and outer diameters, number of fibers, inherent angle of coiling and length of fibers and minimization of gaps between fibers and an adjustment albeit trial and error of above parameters are made to provide a specific performance output to create Dean vortices (see col. 3, line 42 - col. 6, line 21).

Claims 19-21 lack an inventive step under PCT Article 33(3) as being obvious over Belfort in view of U.S. Patent No. 4,631,128 (hereinafter referred to as Coplan et al). Belfort teaches a multi-layered coiled hollow fiber bundle as described in above paragraph. Claims 19-21 essentially differ from the method of Belfort in reciting the step of adjusting winding angle of subsequent layers of fibers. Coplan et al teach a method of fabricating multiple layered hollow fibers comprising the step of adjusting winding angle of subsequent layers of fibers to control ridging of layers (see col. 8, line 36 - col. 11, line 49). It would be obvious to modify the method of Belfort to adjust winding angle of subsequent layers of fibers to control the ridging of layers in the coiled hollow fiber bundle.

Claims 1-25 have industrial applicability as defined by PCT Article 33(4) because the claimed subject matter can be made and/or used in membrane industry.

----- NEW CITATIONS -----

US 5,626,758 A (BELFORT) 06 May 1997 (06.05.97), see column 3, line 43 - col. 6, line 21.

I. Certification under 37 CFR 1.10 (if applicable)

EL634001647US
Express Mail mailing number

18 Dec 2000
Date of Deposit

I hereby certify that the application/correspondence attached hereto is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to Assistant Commissioner for Patents, Washington, D.C. 20231.


Signature of person mailing correspondence

Kimberly A. Atwood
Typed or printed name of person mailing correspondence

II. ☐ New International Application

TITLE	
-------	--

Earliest priority date (Day/Month/Year)

SCREENING DISCLOSURE INFORMATION: In order to assist in screening the accompanying international application for purposes of determining whether a license for foreign transmittal should and could be granted and for other purposes, the following information is supplied. (Note: check as many boxes as apply):

- A. ☐ The invention disclosed was **not** made in the United States.
- B. ☐ There is no prior U.S. application relating to this invention.
- C. ☐ The following prior U.S. application(s) contain subject matter which is related to the invention disclosed in the attached international application. (NOTE: priority to these applications may or may not be claimed on form PCT/RO/101 (Request) and this listing does not constitute a claim for priority).

application no.		filed on	
application no.		filed on	

- D. ☐ The present international application ☐ is identical ☐ contains less subject matter than that found in the prior U.S. application(s) identified in paragraph C.
- E. ☐ The present international application ☐ contains additional subject matter not found in the prior U.S. application(s) identified in paragraph C. above. The additional subject matter is found on pages and ☐ DOES NOT ALTER ☐ MIGHT BE CONSIDERED TO ALTER the general nature of the invention in a manner which would require the U.S. application to have been made available for inspection by the appropriate defense agencies under 35 U.S.C. 181 and 37 CFR 5.1. See 37 CFR 5.15

III. ☒ A Response to an Invitation from the RO/US. The following document(s) is (are) enclosed:

- A. ☐ A Request for An Extension of Time to File a Response
- B. ☐ A Power of Attorney (General or Regular)
- C. ☐ Replacement pages:

pages		of the request (PCT/RO/101)	pages		of the figures
pages		of the description	pages		of the abstract
pages		of the claims			

- D. ☐ Submission of Priority Documents

Priority document		Priority document	
-------------------	--	-------------------	--

- E. ☐ Fees as specified on attached Fee Calculation sheet form PCT/RO/101 annex

IV. ☐ A Request for Rectification under PCT 91 ☐ A Petition ☐ A Sequence Listing Diskette

V. ☒ Other (please specify): Response to Written Opinion (2 pp); Transmittal (1 p); postcard.

The person signing this form is the:

<input type="checkbox"/> Applicant	Timothy J. King
<input checked="" type="checkbox"/> Attorney/Agent (Reg. No.) 38,204	Typed name of signer
<input type="checkbox"/> Common Representative	Signature

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

OCT 26 2000
PCT
LEGAL DEPT.

To: TIMOTHY J. KING
MILLIPORE CORPORATION
80 ASHBY ROAD
BEDFORD, MA 01730

WRITTEN OPINION

(PCT Rule 66)

Date of Mailing (day/month/year)		17 OCT 2000
Applicant's or agent's file reference MCA-433 PC		REPLY DUE within TWO months from the above date of mailing
International application No. PCT/US99/30141	International filing date (day/month/year) 17 DECEMBER 1999	Priority date (day/month/year) 17 DECEMBER 1998
International Patent Classification (IPC) or both national classification and IPC Please See Supplemental Sheet.		
Applicant MILLIPORE CORPORATION		

1. This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step or industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Docketed By:	10-30-00
Due Date:	12-17-00
Reminder (s):	11-17-00
Action Due:	
In Database	

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).~~

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 17 APRIL 2001

Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer SUN UK KIM
Facsimile No. (703) 305-3230	Telephone No. (703) 308-0661

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: TIMOTHY J. KING
MILLIPORE CORPORATION
80 ASHBY ROAD
BEDFORD, MA 01730

PCT

WRITTEN OPINION

(PCT Rule 66)

Applicant's or agent's file reference MCA-433 PC		Date of Mailing (day/month/year) 17 OCT 2000
International application No. PCT/US99/30141		REPLY DUE within TWO months from the above date of mailing
International filing date (day/month/year) 17 DECEMBER 1999	Priority date (day/month/year) 17 DECEMBER 1998	
International Patent Classification (IPC) or both national classification and IPC Please See Supplemental Sheet.		
Applicant MILLIPORE CORPORATION		

1. This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step or industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.


When? See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).~~

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 *bis*.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 17 APRIL 2001

Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer  SUN UK KIM
Facsimile No. (703) 305-3230	Telephone No. (703) 308-0661

I. Basis of the opinion**1. With regard to the elements of the international application:***☒ the international application as originally filed☒ the description:

pages 1-31

pages NONE

pages NONE, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

☒ the claims:

pages 32-35

pages NONE

pages NONE, as amended (together with any statement) under Article 19

pages NONE, filed with the demand

pages NONE, filed with the letter of

☒ the drawings:

pages 1-11

pages NONE

pages NONE, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

☒ the sequence listing part of the description:

pages NONE

pages NONE

pages NONE, as originally filed

pages NONE, filed with the demand

pages NONE, filed with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:**☐ contained in the international application in printed form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.**4. ☒ The amendments have resulted in the cancellation of:**☒ the description, pages NONE☒ the claims, Nos. NONE☒ the drawings, sheets/fig. NONE**5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".

IV. Lack of unity of invention

1. In response to the invitation (Form PCT/IPEA/405) to restrict or pay additional fees the applicant has:

- ☐ restricted the claims. (See Supplemental Sheet)
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. This Authority found that the requirement of unity of invention is not complied with for the following reasons and chose, according to Rule 68.1 not to invite the applicant to restrict or pay additional fees:

3. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this opinion:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

WRITTEN OPINION

International application No.

PCT/US99/30141

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)	Claims <u>19-21</u>	YES
	Claims <u>1-18, 22-25</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-25</u>	NO
Industrial Applicability (IA)	Claims <u>1-25</u>	YES
	Claims <u>NONE</u>	NO

2. citations and explanations

Claims 1-18 and 22-25 lack novelty under PCT Article 33(2) as being anticipated by U.S. Patent No. 5,626,758 (hereinafter referred to as Belfort). Belfort teaches a multi-layered coiled hollow fiber bundle designed to provide a specific performance output to create Dean vortices when subjected to a certain velocity wherein performance depends on the hollow fibers' inner and outer diameters, number of fibers, inherent angle of coiling and length of fibers and minimization of gaps between fibers (see col. 3, line 42 - col. 6, line 21).

Claims 19-21 lack an inventive step under PCT Article 33(3) as being obvious over Belfort in view of U.S. Patent No. 4,631,128 (hereinafter referred to as Coplan et al). Belfort teaches a multi-layered coiled hollow fiber bundle as described in above paragraph. Claims 19-21 essentially differ from the method of Belfort in reciting the step of adjusting winding angle of subsequent layers of fibers. Coplan et al teach a method of fabricating multiple layered hollow fibers comprising the step of adjusting winding angle of subsequent layers of fibers to control ridging of layers (see col. 8, line 36 - col. 11, line 49). It would be obvious to modify the method of Belfort to adjust winding angle of subsequent layers of fibers to control the ridging of layers in the coiled hollow fiber bundle.

Claims 1-25 have industrial applicability as defined by PCT Article 33(4) because the claimed subject matter can be made and/or used in membrane industry.

----- NEW CITATIONS -----

US 5,626,758 A (BELFORT) 06 May 1997 (06.05.97), see column 3, line 43 - col. 6, line 21.

WRITTEN OPINION

International application No.

PCT/US99/30141

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

TIME LIMIT:

The time limit set for response to a Written Opinion may not be extended. 37 CFR 1.484(d). Any response received after the expiration of the time limit set in the Written Opinion will not be considered in preparing the International Preliminary Examination Report.

CLASSIFICATION:

The International Patent Classification (IPC) and/or the National classification are as listed below:
IPC(7): B01D 63/02, 63/04, 63/10; B65H 81/00 and US Cl.: 210/321.74, 321.78, 321.79, 321.8, 321.83, 321.87, 321.88, 32.89, 497.1, 488, 500.23; 156/169, 173, 175

IV. LACK OF UNITY OF INVENTION:

1. This response is made to a telephone Lack of Unity requirement (see telephone memorandum attached hereto or attached to a prior Written Opinion).

CHAPTER II
PCT TELEPHONE MEMORANDUM
FOR
LACK OF UNITY OF INVENTION



PCT No.: PCT/US99/30141
Examiner: SUN UK KIM
Person spoken to: TIMOTHY J. KING
Date of call: 02 OCTOBER 2000

- ☒ Amount of payment approved: \$420.00
- ☒ Deposit account number to be charged: 13-3577
- ☒ Applicant elected to pay for ALL additional inventions
- ☐ Applicant elected to pay only for the additional inventions covered by
- ☐ Group(s):
- encompassing --
- ☐ Claim(s):

☐ Applicant elected a single invention, but elected NOT to pay for any additional inventions. Therefore, Group , encompassing Claim(s) , defining the single invention elected by the Applicant, has been examined.

☒ Applicant was orally advised that there is no right to protest for any group not paid for.

☒ Applicant was orally advised that any protest must be filed no later than 1 Month from the mailing of the Opinion (Form PCT/IPEA/408) or the Final Report (Form PCT/IPEA/409).

Time Limit For Filing A Protest

Applicant is hereby given 1 Month from the mailing date of this Opinion/Final Report in which to file a protest of the holding of lack of unity of invention. In accordance with PCT Rule 68.3, applicant may protest the holding of lack of unity only with respect to the group(s) paid for.

Detailed Reasons For Holding Lack of Unity Of Invention:
(Continued on a separate sheet)

Note: A copy of this form must be attached to the Opinion/Final Report.

ATTACHMENT TO CHAPTER II PCT TELEPHONE MEMORANDUM
FOR
LACK OF UNITY OF INVENTION

Itemized Summary Of Claim Groupings:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-11, drawn to a multi-layered coiled hollow fiber bundle comprising a plurality of coiled hollow fibers arranged so as to create at least two layers.

Group II, claims 12-18, drawn to a method for producing a multi-layered coiled hollow fiber bundle comprising the steps of determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer.

Group III, claims 19-21, drawn to a method of manufacturing a multi-layered separation module comprising the steps of selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the preselected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers.

Group IV, claims 22-25, drawn to a single layered coiled hollow separation module comprising a layer of coiled hollow fibers and a housing.

Detailed Reasons For Holding Lack Of Unity Of Invention:

The inventions listed as Groups I-IV do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: All of the groupings are directed to a method or apparatus for coiled hollow fiber bundle, but each group has a different special technical feature not shared by the remaining groups. Group I is directed to an apparatus which has the special technical feature of a plurality of coiled hollow fibers arranged so as to create at least two layers not shared by any of the remaining groups. Group II is directed to an method which has the special technical feature of determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer not shared by any of the remaining groups. Group III is directed to a method which has the special technical feature of selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the pre-selected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers not shared by any of the remaining groups. Group IV is directed to an apparatus which has the special technical feature of a layer of coiled hollow fibers and a housing not shared by any of the remaining groups.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 25 JAN 2001

WIPO


PCT

Applicant's or agent's file reference MCA-433 PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/30141	International filing date (day/month/year) 17 DECEMBER 1999	Priority date (day/month/year) 17 DECEMBER 1998
International Patent Classification (IPC) or national classification and IPC Please See Supplemental Sheet.		
Applicant MILLIPORE CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets.
- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 0 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 17 JULY 2000	Date of completion of this report 09 JANUARY 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer  SUN UK KIM
Facsimile No. (703) 305-3230	Telephone No. (703) 308-0661

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/30141

I. Basis of the report**1. With regard to the elements of the international application: ***

- ☒ the international application as originally filed
- ☒ the description:
pages 1-31 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____
- ☒ the claims:
pages 32-35 , as originally filed
pages NONE , as amended (together with any statement) under Article 19
pages NONE , filed with the demand
pages NONE , filed with the letter of _____
- ☒ the drawings:
pages 1-11 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____
- ☒ the sequence listing part of the description:
pages NONE , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages NONE
- ☒ the claims, Nos. NONE
- ☒ the drawings, sheets/fig NONE

5. ☐ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

**Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/30141

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

Please See Supplemental Sheet.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/30141

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)	Claims <u>19-21</u>	YES
	Claims <u>1-18, 22-25</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-25</u>	NO
Industrial Applicability (IA)	Claims <u>1-25</u>	YES
	Claims <u>NONE</u>	NO

2. citations and explanations (Rule 70.7)

Claims 1-18 and 22-25 lack novelty under PCT Article 33(2) as being anticipated by U.S. Patent No. 5,626,758 (hereinafter referred to as Belfort). Belfort teaches a multi-layered coiled hollow fiber bundle designed to provide a specific performance output to create Dean vortices when subjected to a certain velocity wherein performance depends on the hollow fibers' inner and outer diameters, number of fibers, inherent angle of coiling and length of fibers and minimization of gaps between fibers and an adjustment albeit trial and error of above parameters are made to provide a specific performance output to create Dean vortices (see col. 3, line 42 - col. 6, line 21).

Claims 19-21 lack an inventive step under PCT Article 33(3) as being obvious over Belfort in view of U.S. Patent No. 4,631,128 (hereinafter referred to as Coplan et al). Belfort teaches a multi-layered coiled hollow fiber bundle as described in above paragraph. Claims 19-21 essentially differ from the method of Belfort in reciting the step of adjusting winding angle of subsequent layers of fibers. Coplan et al teach a method of fabricating multiple layered hollow fibers comprising the step of adjusting winding angle of subsequent layers of fibers to control ridging of layers (see col. 8, line 36 - col. 11, line 49). It would be obvious to modify the method of Belfort to adjust winding angle of subsequent layers of fibers to control the ridging of layers in the coiled hollow fiber bundle.

Claims 1-25 have industrial applicability as defined by PCT Article 33(4) because the claimed subject matter can be made and/or used in membrane industry.

----- NEW CITATIONS -----

US 5,626,758 A (BELFORT) 06 May 1997 (06.05.97), see column 3, line 43 - col. 6, line 21.

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

CLASSIFICATION:

The International Patent Classification (IPC) and/or the National classification are as listed below:

IPC(7): B01D 63/02, 63/04, 63/10; B65H 81/00 and US Cl.: 210/321.74, 321.78, 321.79, 321.8, 321.83, 321.87, 321.88, 32.89, 497.1, 488, 500.23; 156/169, 173, 175

IV. LACK OF UNITY OF INVENTION:

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2, and 13.3 is not complied with for the following reasons:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-11, drawn to a multi-layered coiled hollow fiber bundle comprising a plurality of coiled hollow fibers arranged so as to create at least two layers.

Group II, claim(s) 12-18, drawn to a method for producing a multi-layered coiled hollow fiber bundle comprising the steps of determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer.

Group III, claim(s) 19-21, drawn to a method of manufacturing a multi-layered separation module comprising the steps of selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the preselected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers.

Group IV, claims 22-25, drawn to a single layered coiled hollow separation module comprising a layer of coiled hollow fibers and a housing.

The inventions listed as Groups I-IV do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: All of the groupings are directed to a method or an apparatus for coiled hollow fiber bundle, but each group has a different special technical feature not shared by the remaining groups. Group I is directed to an apparatus which has the special technical feature of a plurality of coiled hollow fibers arranged so as to create at least two layers not shared by any of the remaining groups. Group II is directed to a method which has the special technical feature of determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer not shared by any of the remaining groups. Group III is directed to a method which has the special technical feature of selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the preselected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers not shared by any of the remaining groups. Group IV is directed to an apparatus which has the special technical feature of a layer of coiled hollow fibers and a housing not shared by any of the remaining groups.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/30141

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : B01D 63/02, 63/04, 63/10; B65H 81/00

US CL : Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 210/321.74, 321.78, 321.79, 321.8, 321.83, 321.87, 321.88, 32.89, 497.1, 488, 500.23; 156/169, 173, 175

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,622,086 A (PUCK et al) 11 November 1986 (11.11.86), see entire document.	1-25
Y	US 4,631,128 A (COPLAN et al) 23 December 1986 (23.12.86), see entire document.	1-25
Y	US 4,838,970 A (THIBOS) 13 June 1989 (13.06.89), see entire document.	1-25
Y	US 4,348,458 A (OTSTOT) 07 September 1982 (07.09.82), see entire document.	22

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

17 FEBRUARY 2000

Date of mailing of the international search report

22 MAR 2000

Name and mailing address of the ISA/US
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/30141

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐
☐

- The additional search fees were accompanied by the applicant's protest.
No protest accompanied the payment of additional search fees.

A. CLASSIFICATION OF SUBJECT MATTER:

US CL :

210/321.74, 321.78, 321.79, 321.8, 321.83, 321.87, 321.88, 32.89, 497.1, 488, 500.23; 156/169, 173, 175

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claims 1-11, drawn to a multi-layered coiled hollow fiber bundle comprising a plurality of coiled hollow fibers arranged so as to create at least two layers.

Group II, claims 12-18, drawn to a method for producing a multi-layered coiled hollow fiber bundle comprising the steps of determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer.

Group III, claims 19-21, drawn to a method of manufacturing a multi-layered separation module comprising the steps of selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the pre-selected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers.

Group IV, claims 22-25, drawn to a single layered coiled hollow separation module comprising a layer of coiled hollow fibers and a housing.

The inventions listed as Groups I-IV do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: All of the groupings are directed to a method or apparatus for coiled hollow fiber bundle, but each group has a different special technical feature not shared by the remaining groups. Group I is directed to an apparatus which has the special technical feature of a plurality of coiled hollow fibers arranged so as to create at least two layers not shared by any of the remaining groups. Group II is directed to a method which has the special technical feature of determining a performance parameter from a single layer coiled hollow fiber bundle and determining the needed value of the variables for each additional layer not shared by any of the remaining groups. Group III is directed to a method which has the special technical feature of selecting a mandrel having a predetermined diameter and length, selecting a number of hollow fibers to comprise a layer, winding fibers around the mandrel at the pre-selected angle, adjusting the length of wound fibers, adjusting the fiber lengths, number of fibers and winding angle of subsequent layers not shared by any of the remaining groups. Group IV is directed to an apparatus which has the special technical feature of a layer of coiled hollow fibers and a housing not shared by any of the remaining groups.